

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

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Applicant's or agent's file reference PWO-0841	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA 02/01841	International filing date (day/month/year) 29.11.2002	Priority date (day/month/year) 29.11.2002
International Patent Classification (IPC) or both national classification and IPC G06F9/445		
Applicant RESEARCH IN MOTION LIMITED		

- This International preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
 These annexes consist of a total of 7 sheets.

- This report contains indications relating to the following items:
 - ☒ Basis of the opinion
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain documents cited
 - ☐ Certain defects in the international application
 - ☐ Certain observations on the international application

Date of submission of the demand 01.12.2003	Date of completion of this report 14.10.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Dewyn, T Telephone No. +31 70 340-2145 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/CA 02/01841**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1, 3-11 as originally filed
2, 2a, 2b filed with telefax on 08.07.2004

Claims, Numbers

1-18 filed with telefax on 08.07.2004

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: . , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
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5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-18
	No: Claims	
Inventive step (IS)	Yes: Claims	5,11,17
	No: Claims	1-4,6-10,12-16,18
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item I

Basis of the report

The present application does not meet the requirements of Article 34(2)(b), since the amendments made by the applicant in the new independent claims 1,7,13 go beyond the disclosure in the application as filed. Indeed, it can not be directly and unambiguously derived from the application as originally filed that bytecodes and information structure entries from two or more class files are combined without duplication of entries. The application as originally filed only discloses that constant pool entries are combined without duplication of entries, as can be read on page 5, paragraph [0022].

As a consequence, this report is established as if said amendment had not been made (Rule 70.2(c) PCT), and therefore will not consider the passage stating "a byte codes and information ... without duplication of entries" in claims 1, 13, nor the passage stating "generating the byte codes and information ... without duplication" in claim 7.

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: WO-A-9949392 (International Business Machines Corporation)

D2: US-A1-2002170047 (Brian Swetland)

2. the present application does not meet the requirements of Article 33(1) PCT, because the subject-matter of claims 1-4,6-10,12-16,18 does not involve an inventive step in the sense of Article 33(3) PCT.

- 2.1 Document D2 (page 7, right column, [0082], page 8, left column, [0085]) discloses the following subject-matter of claim 1 :

a computing unit being able to execute a Java Virtual Machine, generating a combination of a plurality of class files ("a unified programming object", see [0083]), combining constant pool entries from said class files without duplication of entries.

The subject-matter of claim 1 differs from D2, in that in claim 1, a fixup table is included in the file which combines the plurality of class files.

The problem to be solved by the present invention may therefore be regarded as : how to provide information to the Java Virtual Machine for resolving, at link time, at least one entry in the file combining the plurality of class files.

Document D1 (page 4, lines 5-24) discloses the use of fixup tables in order to solve the problem posed. Although D1 does not disclose the combining of class files, the skilled person would see that the solution of providing information for resolving references at link time via fixup tables is unrelated to the combining of class files, and would have no particular problem applying said solution to the system of D2, thereby arriving at the solution of claim 1. Indeed, whether the fixup table holds information for one class file, or for multiple class files combined together, the principle of holding information regarding external class files remains unchanged.

As a consequence, claim 1 is not allowable under Article 33(3) PCT for lack of inventive step of its subject-matter.

For the same reasons, corresponding claims 7,13 are not allowable under Article 33(3) PCT for lack of inventive step of their subject-matter.

- 2.2 The subject-matter of dependent claims 2,8,14 does not involve an inventive step, since D1 discloses fixup tables including symbolic references to methods not contained in the class file (page 4, lines 21-24).
- 2.3 The subject-matter of dependent claims 3,9,15 does not involve an inventive step, since it would be a straightforward solution to keep multiple files instead of one single file when grouping the class files, in case there are limitations of size for individual files which don't allow for one single file. Defining a "sibling group" does not, in itself, solve any technical problem, and can therefore not be considered inventive.
- 2.4 The subject-matter of dependent claims 4,10,16 does not involve an inventive step, since D1 (page 4, lines 13-24) discloses replacing a symbolic reference with a hard offset for cross-referencing a method.

2.5 The subject-matter of dependent claims 6,12,18 does not involve an inventive step, since D1 discloses fixup tables including symbolic references to methods not contained in the class file (page 4, lines 21-24).

3. The subject-matter of claims 5,11,17 involves an inventive step in the sense of Article 33(3) PCT.

3.1 Document D2, which is considered the closest prior art, does not disclose the additional subject-matter of claim 5:

The problem to be solved may therefore be regarded as : how to manage the grouping of class files in case of limitations of size for individual files, while optimizing for size.

D2 does not consider the problem of limitation of size for the grouped file, and therefore groups together all class files. While it is straightforward to keep multiple files if one file is simply not possible because of size, it is not straightforward to create a relationship between certain files, and use hard offsets for referencing between them, while keeping symbolic references for references between files that don't have this relationship. In D1 (page 4, lines 13-24), certain references are replaced with offsets while others are kept symbolic, but this is to solve an unrelated problem, namely a security problem. No hint is given towards using such a solution for the purpose of size optimization.

Therefore, the subject-matter of claim 5 is considered to be inventive in the sense of Article 33(3) PCT.

For the same reasons, corresponding claims 11,17 are also considered to be inventive in the sense of Article 33(3) PCT.

[0004] Therefore, it would be beneficial to generate directly interpretable files that are of a smaller size than *.class* files, while providing a solution for references between *.class* files.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The subject matter regarded as the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, together with objects, features and advantages thereof, may best be understood by reference to the following detailed description when read with the accompanied drawings in which:

[0006] FIGS. 1A and 1B are simplified prior art illustrations of six exemplary *.class* files;

[0007] FIGS. 2A and 2B are simplified illustrations of exemplary *.cod* files, according to some embodiments of the present invention;

[0008] FIG. 3 is a flowchart illustration of a method for generating *.cod* files, according to some embodiments of the present invention; and

[0009] FIG. 4 is a simplified block-diagram illustration of a device having a computing unit and directly addressable memory, according to some embodiments of the present invention.

[0010] It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

[0046] What is claimed is:

1. A device comprising:

a computing unit able to execute a Java Virtual Machine; and
memory directly addressable by said computing unit, said memory storing files to be directly linked and interpreted by said Java Virtual Machine without reformatting, said files comprising hard offsets and symbolic references.

2. The device of claim 1, wherein said computing unit is a general-purpose microprocessor.

3. The device of claim 1, wherein said memory is not-OR flash memory.

4. The device of claim 3, wherein the size of said files does not exceed 64 kiloBytes.

5. The device of claim 1, wherein at least two of said files are sibling files comprising hard offsets to references in said sibling files.

6. An article storing software that when executed on a general purpose computer results in:

generating one or more groups of files that do not require reformatting to be directly linkable and interpretable by a Java Virtual Machine, wherein cross-references between files in a common group appear as hard offsets and cross-references between files in different groups appear as symbolic references.

7. A method comprising:

identifying cross-references between classes, methods and fields in said *.class* files; and

generating a group of files comprising hard offset references for cross-references to elements of *.class* files whose generated files are in said group and comprising symbolic references for any other cross-references.

8. The method of claim 7, wherein said generated files do not require reformatting to be directly linkable and interpretable by a Java Virtual Machine.